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# RISK MANAGEMENT IN TELECOMMUNICATIONS SERVICES IN BOSNIA AND HERZEGOVINA

## ABSTRACT

In the last few decades, the issue of risk management has become an increasingly important aspect of every company's business activities. Such views are more and more present in the service sector whose GDP share has registered a continuous growth within both national economies and on the global level. Intangibility and some other specific features of services when compared to physical products require a different approach to the activities in the field of risk management, particularly when it comes to capital intensive services such as telecommunications. This type of services is mainly provided within large companies that need to pay attention to the risk management process, from identification, risk evaluation to selection and application of the appropriate risk management method. Risk management methods include a group of methods for the physical control of risk and a group of methods for risk financing by means of risk retention or insurance. All these methods can be applied on a wide set of personal, property and liability risks met by the companies and employees in the telecommunications sector. The paper attempts to present an overview of the specific features of risk management in companies in the telecommunications sectors with the case study of the leading telecommunications service provider in Bosnia and Herzegovina.

**Keywords:** Risk, risk management, insurance, accidents, telecommunications services, Bosnia and Herzegovina

## 1. Introduction

Dynamism, growing complexity of business, noticeable competitiveness, and the global market liberalization lead to exposure to various risks met by economic subjects within their business activities. In other words, risks appear, transform, join and cumulate, which endangers the company's business and its supply chains. That is precisely the reason why risk management needs to be given special attention within supply chain management.

Modern business conditions result in the need for risk management to be an integral part of every company's business strategy. The company's management is well aware that good risk management can help a lot in the reduction of business costs. Risk management aims at protecting the company's property and profit by decreasing potentials for loss and timely discovering new, still unidentified risks that can lead to potential losses (Corbett, 2004; Hodges, 2000).

Christopher's (2005) definition of supply chain management as "the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less costs to the supply chain as a whole" shows how important risk management is for supply chains today (Bandaly et al., 2012; Ritchie and Brindley, 2007; Singhal et al., 2011). This is particularly evident in the service sector where, due to the specificities of the service product in comparison to the traditional supply chains, the risk management process is far more difficult to organize. It is very important to define the scope within which risks would be observed. The latest stage in the evolution of risk management is Enterprise Risk Management (ERM) which represents a holistic approach to risk management. It includes the correlation among various risks aimed at minimizing risk exposure for a company as whole, whether the risks come from natural or political, economic, and technical sources. Nowadays, ERM has a very significant role in the regulation and business of financial institutions, primarily banks (Cumming and Hirtle, 2001; Rouse, 2004; Wu and Olson, 2010).

When considering risk exposure, a particular importance for economic subjects is given to personal, property, and liability risks, and they will be given the central position in this paper. These are pure risks that are the consequence of chance where the possible outcomes are either "loss" or "no loss", meaning that there is no possibility for a profit as with the speculative risks (Kozarević, 2010). Since a part of an organization's wealth is created by investing into human resources, the possibility for an injury or death of an employee can cause significant loss to that organization. The specificity of these risks lies in the fact that they are related to an individual (employee), which is why managing these risks can be treated as personal risk management. Namely, both companies and individuals (regardless of the company's interest) are interested in these risks. Also, the property provides its owners various benefits, depending on how they use it. Its value can drop or be lost due to a wide range of perils, which cause multiple losses. Property includes movable or immovable goods and/or rights in the company's ownership, which can be represented by money and therefore has a certain value. Also, within its business activity, a company may cause losses for third parties by exposing itself to numerous liability-related risks that, whether the issue is intention or employees' negligence, require a special approach

in the stage of identification and evaluation of these parties' risk exposure. It is important to emphasize that the legislative system imposes various types of liability which is why it is important to discuss the risks that carry this type of liability. Therefore, the company needs to continuously monitor, measure, and find the methods for pure risk management.

Within every national economy, the sector of telecommunications stands out as a specific segment of the service sector (Wu et al., 2011). This sector is characterized by increasing competition and a new generation of telecommunication networks which requires that the telecommunications sector companies redefine their role on the market and create new business models so as to create new sources of profits. These problems do not skirt small economies such as the one of Bosnia and Herzegovina (BIH). Regarding this, the constant introduction of new services, investment into new infrastructure networks, change in employee number as well as changes in professional qualifications of employees may have a significant impact on the number or work-related accidents as well as on the occurrence of potential loss on the company's property and loss to third parties. Since modern business activities in the telecommunications sector are challenging in every respect, including the establishment of business security, where everything is planned and ultimately controlled, it is crucial to understand and predict personal, property and liability risks of potential sudden and unwanted losses. This is certainly one of the most important issues in all stages of supply chain logistics management (Agrell et al., 2004; Bowersox et al., 2002).

The general aim of this paper is to determine the efficiency of the existing procedures for pure risk management, the efficiency of risk transfer by means of insurance, as well as the possibility for improving the existing situation in the telecommunications sector in BIH by determining the key factors that are crucial for the efficiency of the risk management process. Therefore, the focus is on the largest telecommunications provider on the market of BIH, BH Telecom d.d. Sarajevo (joint stock company).

Section 1 introduces the research problem and presents a review of previous researches. Section 2 presents the theoretical background. Section 3 provides the methodology of empirical research, and Section 4 presents the results and discussion of the case study of BH Telecom, while Section 5 wraps up the conclusions.

## 2. Theoretical background

### 2.1 Specificities of risks and risk management in telecommunications services

Today, the telecommunication network presents a "central nervous system" of the world economy. The telecommunications services sector is also a factor of the integration process in a society as well as a factor of the creation of a single market and globalization in business. Besides that, it is largely dependent on the level of development of a certain region in terms of technical-technological and socio-economic contexts. In addition, it also depends on the regulatory frameworks, both national and international (Pejčić-Tarle et al., 2005).

If we observe pure risks management in the telecommunications sector, it is necessary to take into consideration the specificities of this sector. In other words, teletraffic is a complex phenomenon of providing the services of the transfer of various forms of information by activating the resources of the telecommunication network. Along with the accompanying processes and the technology that makes them possible, it is a significant source of various types of perils and possible accidents (Bošnjak, 2001; Ernst and Young, 2010). The risks in this sector also need to be analyzed in the context of the efforts to reduce the impact of these services on the environment, which have been labeled as green supply chain management (Swami and Shah, 2010). Provided that we start from personal risks, the specificities of the risks to which human resources are exposed come from the fact that a significant number of employees in this sector spend most of their working life on the tasks of building new and maintaining the existing telecommunication networks. In the process, they are in a potentially dangerous environment that can jeopardize their health and life. Some jobs are more exposed to risks than others, which is why knowing the employee structure and their business tasks is necessary for the identification of the mentioned risks. Also, when it comes to the important company staff members, who have particular knowledge and skills, their exposure to risks is an important segment of the company's business and it is necessary to plan special programs for the risks to which they are exposed. By appropriate procedures for managing such risks the company casts off a great burden and directs more energy to other business issues. Aimed at improving personal risk management, special attention should

be given to staff training and education. Well-trained staff shall significantly reduce the number of workplace accidents and in case of an accident react better which reduces its negative consequences. Also, a well trained employee shall have a higher productivity.

Perils that the property of telecommunications companies is exposed to are basically related to physical, social and economic sources (Williams et al., 1998). Physical perils are related to natural forces such as fire, storm, etc. while social perils are related to individuals' deviant behavior (such as theft, violence, frauds). Economic perils can be internal (such as inappropriate storage of products) and external (for example a business partner's breaking the contract due to a crisis in its industry). The level of exposure to property risks largely depends on the type of property which the company has, to what extent the property is used, and on the scope of the company's activities. A drop in property value, lost profit and increased costs are negative financial effects of property losses. Technical complexity of the telecommunications system, its high material value, the need for constant functioning of the supply chain, as well as a high level of sensitivity to various possible disorders characterize the property of the telecommunications sector. All the mentioned emphasized the importance of identification, evaluation, and application of appropriate methods for managing property risks in the telecommunications sector in BiH. Namely, the most important property items of the telecommunications companies are fixed intangible assets (patents, licenses, trademarks, software, etc) and tangible assets that include real estate, plants and equipment. Due to the fact that these are all highly valuable elements of business property, potential loss can significantly jeopardize a company's business. Therefore, the analysis of the existing situation in the construction, security, and maintenance is the basis for identifying and evaluating property risks. The liability risks for the losses caused to third parties during business activities can materially endanger and have repercussions on regular business activities of a company. That is the reason why an efficient system of managing these risks is also an important segment of a company's business.

## 2.2 Place or risk management in the organizational structure of companies in the telecommunications sector

The companies in the telecommunications sector in BIH are in the category of large companies. In that context, it is necessary to provide an appropriate organizational solution by which the process of risk management would be improved. Besides the strategy and policy of risk management, meaning the procedures for identifying and evaluating risk, a successful and efficient system of the company's risk management also includes appropriate organizational structures of a company (Andersen, 2010). Under modern economic conditions and rapid market changes that significantly affect the organization of a company's business activities, it is an imperative to establish such an organizational structure that would provide the necessary flexibility and the basis for protection against potential risks of the company (Corvellec, 2009).

Due to the relation among various risks that a business organization is exposed to, a comprehensive approach to risks and coordination among various departments and levels of management increase the probability for the provision of the right programs for risk management (Klinke and Renn, 2002). The company's sectors and services need to be aware of the risks that occur as a consequence of their everyday activities and liabilities in the supply chain. The scopes of management responsibility clearly include the management of risk identification and care for the safety of employees and company's assets. Proceeding from this, the company's management becomes aware of the fact that the function of risk management, when compared to other functions in the company, significantly reduces the total business costs. Consequently, the importance and complexity of this managerial function increases day by day (Ward, 2003). The role of particular business functions in the process of risk management is observed from the aspect of their involvement in the stages of identification and evaluation of the present risks of a company.

## 2.3 Methods for risk management in the companies in the telecommunications sector

Along with the development of the risk management process, numerous methods were developed

for risk management, based on the postulates of statistics, mathematics, financial and actuarial mathematics, etc. Balancing between the profit or the benefits that a certain method brings and the costs it creates is the basic criterion for selecting the method for risk management in the companies in the telecommunications sector. In some cases, outer influence such as state regulations can affect the selection of the method. However, even when such initiatives do not exist, some technique for managing risks must be used due to the following (Williams et al., 1998):

- costs of financing the emerged risk are usually higher than the costs for its prevention and/or reduction of its consequences,
- loss usually creates indirect or hidden costs that are frequently revealed only much later, and
- loss can have an effect on the environment of the given company.

If the loss is of high probability and intensity, the only practical alternative is to avoid such risk. Risk avoidance includes avoiding the property, person, or the activity that can cause the losses. By avoiding risk, the companies in the telecommunications sector become certain that no potential loss would happen. However, bearing in mind the fact that risks act in a combination, accepting the decisions on risk avoidance can mean creating new or expanding the existing risks of the company. Also, the companies in the telecommunications sector are not able to avoid all the risks since some of the risks must be taken due to the nature of the service. That is why risk avoidance is usually not an acceptable option. Finally, it should be mentioned that risk can be so important for the company's existence that its avoidance can in no way be taken into consideration, as is the case in mining (Evans et al., 2007; Komljenovic and Kecojevic, 2007; Kozarevic et al., 2013).

One of the more important ways of risk management is the prevention or reduction of loss probability. It is a set of procedures and methods that act in the direction of potential sources of peril with the aim of preventing the occurrence of an accident. The application of modern methods of prevention and prevention engineering (safety protection on machines and equipment, constant controls of equipment, appliances, etc.) is the most efficient way of physical management of risks and they have a noticeable effect on risk occurrence and its devel-

opment. Besides the measures of technical protection, risks are physically controlled by employees as well. Regarding this, constant education of employees is needed in the field of work protection and fire protection, which enables proper handling of the work system in the companies in the telecommunications sector. This significantly affects the absence or reduction of physical property risks.

Although the measures of loss reduction can be planned even before the occurrence of an accident, their basic function is to eliminate the effect of damage during their occurrence. By this technique, the companies in the telecommunications sector try to reduce the intensity of the potential damage using fire-prevention systems, limiting cash at the cash office, installing burglar-proof systems, etc.

The methods of financing risks ensure the resources for covering the damage by using internal and external resources. Internal financing is also called risk retention while the external financing includes the transfer of risks by means of insurance, contracts, etc. The inability to physically control all the risks present in the companies in the telecommunications sector indicates that they need to be financed.

The method of risk retention implies that the identified and evaluated risk is retained completely or partially. This method enables a simpler and faster way to cover the entire loss, neglecting the evaluated amount of the lost profit that occurred as the consequences of teletraffic loss. Also, risk retention as the method of risk financing is in many cases the best possible way for managing the risks that result in relatively small losses.

Insurance is the most appropriate method for managing the risks with the low probability and high amount of potential loss. By managing risks in the telecommunications sector by means of insurance, the potential loss, meaning the uncertain financial expenditure, turns into a definite cost, that is, insurance premium. In that way, business activities are protected from potential costs that cannot be built into the business planning, as it can be done by means of an insurance premium that is a certain cost of the company's business. Bearing in mind the aforementioned, insurance is not the cost but rather the investment that can prevent significant financial losses in business activities of the telecommunications companies due to the sudden losses. For the risks with the high probability of loss, the insurance method is not the proper way to manage risk, since

the higher the probability the higher the premium paid for insurance. Therefore, if the method of risk transfer is used, there always needs to be a reasonable relation between the transfer costs and the value that is transferred. This means that one should not retain the risk with the potential loss that is high when compared to the premium saved by retaining the risk.

### **3. Methodology - Case study: BH Telecom**

The telecommunications providers on the market of BIH are BH Telecom d.d. Sarajevo, M:tel a.d. Banja Luka and Hrvatske telekomunikacije d.d. Mostar. This research was conducted at BH Telecom d.d. Sarajevo, as the leading provider on the BIH market. A large number of employees at BH Telecom have jobs with special work conditions. They are exposed to the danger of working with electrical equipment and at heights to construct and maintain the telecommunication network, while the fitting and work with optic fibers can be dangerous due to fire caused by flammable matters. Consequently, one telecommunications activity demands various operations or functions that include the possibility of an injury or disease that was the consequence of dangerous exposure.

It is a fact that in 2012 BH Telecom had assets worth over EUR 700 million, out of which almost 50% belong to material assets. It is an indicator that particular attention should be paid to this type of property, with the aim of protecting it from various risks. The most important property items are immovables, plants and equipment. This is an important value of business property where potential damage can evidently jeopardize the company's business. The basic part of the material assets are access networks, the cable channel system, generating plant and transmission devices, antenna pillars and towers as well as the stock of equipment and investment material that are also threatened by various types of danger.

#### **3.1 Risk management methods**

Based on the knowledge of the probability of occurrence and size of potential loss, various methods of control and financing for risk management are used



in BH Telecom. The prevention method is used for both personal and property risks. Aimed at managing the risks of poor health, the preventive systematic examinations of employees are taken for early detection of chronic illnesses, illnesses that can be worsened by work, and for the purpose of preserving the health and work abilities of employees. The company also secures preventive examinations for the workers who are hired for the jobs with special work conditions and for those who are transferred to such positions. In terms of property risks, serious technical prevention measures are taken against the risks such as surveillance cameras, a fire protection system and alarm, systems for fire detection and automatic fire fighting systems (sprinkler, COD, foam, powder, steam, as well as hand firefighting equipment: movable fire distinguishers, hydrant, heat detectors, etc.)

At the places where there is a higher probability of the occurrence of fire, special measures of fire protection are taken, depending on the materials and matters handled. Special measures of fire protection refer to the rooms of electric power plants for supplying telecommunications devices. Aimed at the protection of this equipment, special attention should be given to the elimination of all the causes that can lead to a fire as well as to the usage of several specialized fire fighting systems. Also, monitoring and data collection on the condition and application of fire protection measures are made, as well as the training program for the staff in the field of fire protection. Besides the measures of technical protection, certain measures of physical protection are implemented (such as outsourcing for security personnel) that refer to the prevention and discovering harmful events and anti-burglary activities that can result in property loss or put the lives of employees in danger. For the purpose of protecting the property values, preventive maintenance is performed on access networks, the systems of terminal equipment and all other telecommunications equipment in order to ensure proper operating condition and decrease the probability of failure occurrence.

Regarding the risk financing methods, a special role is given to the transfer of risks by means of insurance. Besides employee's accident insurance, a significant part of the property is insured from various risks with some liability risks insured as well. Apart from insurance, other types of risk transfer are rarely used, while a significant part of the risk is retained by the company.

### 3.2 Model

Developing the system for risk management at the telecommunications sector has improved the decision making processes in terms of risk. It enables controlled separation of activities, contributes to the efficient allocation of capital and the company's resources, and protects and increases the company's assets. Starting from the theoretical background described in the previous sections of this paper, we can formulate the model of risk management as the function of three key factors:

$$\text{RME} = f(S, M, O)$$

where:

RME – Risk management efficiency,

S – Strategic approach,

M – Risk management methods adequacy,

O – Organization of risk management.

### 3.3 Methodology of empirical research

In order to define the exact indicators of the efficiency of the risk management processes at BH Telecom, the primary research was conducted. The data were gathered by means of a survey with a questionnaire especially made for this purpose. The questionnaire included the questions related to various aspects of risk management. A significant number of them were structured in such a way that the answers were presented in a form of a scale from 1 (the worst) to 5 (the best world's practice). In addition, the subjects answered some of the questions by selecting one or more answers offered, so after every question, the subjects had the option to insert comments, additional remarks and suggestions.

The first part of the questionnaire, *Risk management process*, is in terms of contents the largest and aimed at determining the level of the subjects' understanding of the risk management process. Therefore, the questions are formulated so as to enable the evaluation of the application of various methods for risk identification, risk evaluation, and risk management. The responsibilities regarding risks and adaptation of the existing organizational structure of the company to the risk management process are also problematized in this part of the questionnaire.

Due to a wider discussion of the whole issue of the

risk management process, the risks that go beyond the framework of pure risks are briefly presented in the second part of the questionnaire *Business risks*. This part is dedicated to the identification and evaluation of market risks caused by unexpected market disturbances and economic fluctuation. The issues of the company's readiness to identify various financial risks as well as the changes that emerged in the legal environment are also processed in this part of the questionnaire.

The third part of the questionnaire called *Personal risks* covers the procedure of identification and evaluation of risks to which employees are exposed, in terms of safety and protection at work through the assessment of efficiency levels of defined and adopted procedures/instructions of the company.

The fourth part of the questionnaire, *Property risks*, presents the issue of property risks from the aspect of performing constant identification and evaluation of property risks and assessing the level of presence of a certain method for insurance against property risks. The questionnaire also discussed the issue of application and efficiency of the existing procedures for insurance of property through their implementation.

The fifth part of the questionnaire, *Liability risks*, describes the procedure of identification and evaluation of the company's liability risks as well as the level of the presence of insurance against this type of risk.

The questions in the last, sixth part of the questionnaire named *Resources* are limited to those key risks that are related to investing into technology and equipment that support organization units in managing risks (report software, data bases on potential and present risks, etc.) along with the education of employees in the segment of risk management.

The data were collected by means of an on-line survey, while the questionnaires were distributed by sending an e-mail to the subjects. The total number of filled questionnaires was 53. Within every organization unit there was a survey of all relevant employees who were competent enough to evaluate this specific segment of management and whose perceptions need to be acknowledged during the evaluation of the efficiency of the entire risk management process. These are usually the members of the company's management (board of directors, heads of organizational units, department heads etc.) as well as the bodies of control and revision (in-

ternal control and audit department). Therefore, the research sample was designed as the expert sample based on long-term experience and knowledge of the subjects.

## 4. Results and discussion

### 4.1 Descriptive analysis

According to the subjects, risk identification is mostly based on various types of reports on business while more complex techniques for risk identification such as SWOT analysis, analysis of indirect perils, and flow chart diagrams are rarely used. It is obvious that risks are observed primarily from the point of view of business risks.

It is necessary to provide constant analysis and evaluation of risk in order to achieve early identification of the company's risks, understand their consequences and evaluate the probability of the occurrence of any type of loss, so that the problems could be prevented where possible and the company prepared for unexpected situations. The largest number of the subjects (48%) believes that risk evaluation is mainly based on the usage of statistical methods, followed by the analysis of past experience (46%) and expert evaluation (28%).

The subjects emphasized employees' education (18%) and insurance (17%) as the most present methods for risk management. Only 15% of the subjects think that risk can be controlled and that risk protection is not only the use of the insurance method but also the use of prevention measures. It is also evident that in their relations with business partners, the company makes appropriate guarantees (bank guarantees) that are an integral part of the concluded contracts. Capital reserves are rarely set aside in case of emergency, which can be explained by significant usage of the insurance method in the company, while risk retention is mentioned in only 8% of the cases.

Due to the mutual relations among the risks to which a business organization is exposed, an integral approach to risks and coordination among various departments and management levels increases the probability that the right programs for risk management would be provided. Based on the subjects' attitudes, it is evident that various departments and management levels take care of risk management. A total of 54% of the subjects believe that this task

is usually performed by the heads of organizational units, 48% of them think that this is mainly done by the company's board of directors, while 12% of the subjects think that the company's owners participate the least in the process or risk management.

Appropriate communication related to employees being informed on risk management is confirmed by 73% of the subjects while 27% of them gave negative answers. This confirms that, due to a heterogeneous nature of risk in the telecommunications sector, employees are familiar with the framework for its management. Also, it is evident that the culture of risk as the general awareness of the existence of risks at all management levels as well as the attitude and behavior of employees regarding risks are at a desirable level. This also shows that there is an efficient communication and cooperation at all organizational levels when the risk management process is concerned.

For the purpose of identification, evaluation, control and supervision of risks, numerous reports are made, analyzed and presented to the management. By the adopted procedures the company specifies regular monthly reporting to the management on the following: positive and negative changes and business indicators; the situation with work protection with the suggested improvement measures aimed at reducing labor related injuries and providing a higher level of safety; important internal losses and damage of the company's property; the number of reported and paid damage claims by means of insurance; etc.

As many as 90% of the subjects think that the company has an efficient system of internal control over risk management with the aim of monitoring the efficiency of the company's business, reliability of financial and other types of information, harmonization with regulations, procedures, internal acts and standards of the company.

As many as 38% of the subjects believe that the company insures all its property exposed to risks, while 54% of them think that the company insures over 50% of its property. This proves that insurance is the most present method for managing a company's property risks. This confirms that the importance and efficiency of this risk management instrument was recognized as one of the most appropriate ways for managing property risks.

Seventy-three percent of the subjects confirm that the company gives special attention to risks to which their employees are exposed. Thus, for the purpose of higher protection of workers, all employees are accident insured. Also, 63% of the subjects state that the company insures all its important exposure to liability risks.

Adopting business policies and procedures for risk management, which need to be integrated into the current activities of the company, is one of the more important steps taken with the aim of efficient risk management. Based on 91% of the positive answers given by the subjects, it is possible to state that the company has developed procedures for insuring property risks, personal risks and liability risks that entirely satisfy the company's needs. This is also confirmed by the documents related to the procedure of reporting, registering, evaluating and liquidating losses on the basis of insurance contracts made by the company. Also, the company constantly educates its staff through permanent upgrading of their knowledge and skills in the field of risk management.

#### *4.2 Factor analysis*

For the purpose of recognizing the key factors that are crucial for the efficiency of risk management, the collected responses on a 1-5 scale were processed by the application of the method of factorial analysis. By this method a higher number of variables are decreased to a smaller number of the basic variables that affect the development of the risk management process. Determining the basic factors that affect the development of the risk management process should help the company's management in improving risk management.

The factor analysis of the risk management process was conducted on the following 16 original variables whose basic statistical indicators are given in Table 1. The most important results obtained by the factor analysis are related to the correlation matrix presented in Appendix 1.



**Table 1 Basic statistical indicators of the analyzed variables**

Variables		Mean	Standard deviation
VAR01	Risk avoidance – as risk management method	4.04	0.876
VAR02	Risk prevention– as risk management method	4.17	0.914
VAR03	Executive staff responsibilities regarding risk	3.94	0.818
VAR04	Adaptation of organizational structure to the company's risks	3.51	0.800
VAR05	Holding the strategy of risk management adopted to the company's specificities	3.64	0.787
VAR06	Holding the strategy of the company's business adopted to the company's risks	3.62	0.814
VAR07	Identification of market risks	3.83	1.087
VAR08	Identification of changes in the political environment that directly affect the company's business	3.57	1.217
VAR09	Identification of changes in the legal environment	3.72	1.116
VAR10	Identification of risks to which the sale of telecommunications services are exposed	3.74	0.711
VAR11	Winning new markets aimed at increasing competitiveness	3.23	1.154
VAR12	Risk management as an integral part of the creation of investment projects	3.51	0.891
VAR13	Safety and protection at work defined by the company's procedures	3.58	0.842
VAR14	Delivering reports on the evaluation of risks to authorized executives	4.17	0.643
VAR15	Efficiency of procedures for insurance against the risks to which employees are exposed, property risks, and liability risks	3.60	0.768
VAR16	Investing into technology and equipment that improves risk management	3.38	0.657

*Source: Author's calculation*

Using the automated analytical tools for multivariate statistical analysis, Kaiser-Meyer-Olkin Measure of Sampling Adequacy of 0.813 ( $KMO > 0.6$ ) and level of significance obtained with Bartlett's Test of Sphericity of 0.000 ( $p < 0.05$ ) were established, confirming the sample correlation matrix adequacy for the factorization.

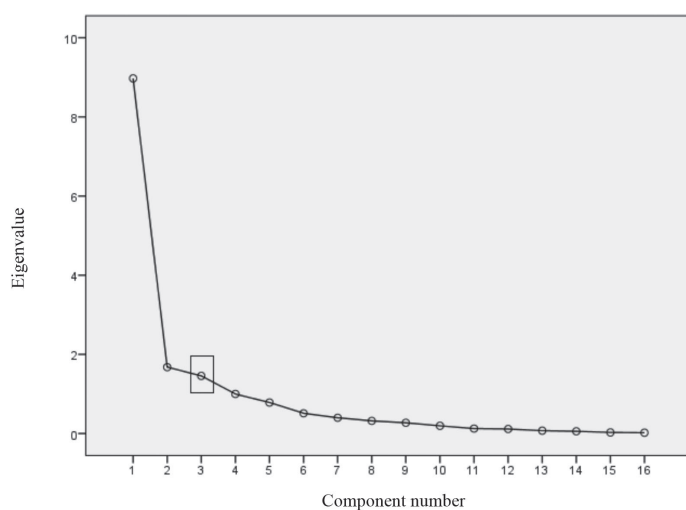
In this research 16 basic variables were reduced by the factor analysis to three factors with eigenvalues higher than 1, which are given in Table 2. These three components explain for 56.08%, 10.48% and 9.10% of the variance, meaning the total of 75.67% of the variance. The shares of these factors are shown in Graph 1.

**Table 2 Total variance explained**

Components	Initial eigenvalues			Extraction sums of squared loadings			Rotated sums of squared loadings
	Total	Variance %	Cumulative %	Total	Variance %	Cumulative %	Total
1	8.973	56.081	56.081	8.973	56.081	56.081	7.992
2	1.677	10.483	66.564	1.677	10.483	66.564	3.260
3	1.456	9.101	75.665	1.456	9.101	75.665	5.203
4	.999	6.247	81.911				
5	.783	4.894	86.806				
6	.512	3.199	90.005				
7	.398	2.487	92.492				
8	.319	1.995	94.488				
9	.272	1.699	96.186				
10	.195	1.216	97.403				
11	.126	.785	98.188				
12	.114	.713	98.902				
13	.072	.448	99.349				
14	.056	.349	99.698				
15	.027	.172	99.870				
16	.021	.130	100.000				

Source: Author's calculation (SPSS 21); Extraction method: Principal Component Analysis.

**Graph 1 The scree plot**



From the scree plot, the breaking point of the diagram is evident on the joining of variables 3 and 4, so that the three variables that explain a greater part of the variance than others are retained.

Source: Author's calculation (SPSS 21)

**Table 3 Rotated factors matrix**

	Factor		
	1	2	3
VAR09	<b>.981</b>	.052	-.086
VAR11	<b>.912</b>	-.152	.000
VAR07	<b>.890</b>	.188	-.134
VAR08	<b>.832</b>	-.059	.054
VAR14	<b>.807</b>	.086	.100
VAR10	<b>.654</b>	.294	-.150
VAR15	<b>.628</b>	-.025	.377
VAR16	<b>.573</b>	-.055	.243
VAR12	<b>.501</b>	.186	.483
VAR02	.038	<b>.913</b>	.056
VAR01	.158	<b>.836</b>	.026
VAR03	-.190	.381	<b>.838</b>
VAR04	.151	-.253	<b>.785</b>
VAR05	.473	-.098	<b>.573</b>
VAR13	.143	.366	<b>.543</b>
VAR06	.509	.117	<b>.538</b>

Source: Author's calculation (SPSS 21); Extraction method: Principal component analysis; Rotation method: Oblimin with Kaiser Normalization.

The data in Table 3 show that the analysis emphasized the three factors that explain 75% of the total variance and that affect the efficiency of risk management. They are:

- Factor 1: The strategic approach which affect all types of risk;
- Factor 2: Application of risk management methods;
- Factor 3: Organizational solutions.

#### 4.3 Discussion

The company's aim while managing risks is the appropriate identification, evaluation of loss probability and intensity, and control or prevention of those risks that harm or can possibly harm the company's capability in creating the business strategy as well as long term and short term business goals. Based on the results of the factor analysis, the marked factors serve as recommendations for the direction where to focus the activities for the improvement of the risk management process at BH Telecom.

The strategic approach in risk management, meaning the development of the appropriate strategy and

its efficient implementation are the key activities for improving the process of the company's risk management. The company should develop the so called "Risk management strategy" that would identify all the fields exposed to risk. The implementation of such a strategy requires that the framework for determining, evaluating, monitoring and reporting on risks is completely understood at all levels of the organization with constant education of employees as well as the coordination of risk management. The risk management strategy helps the company's managers to adapt their decisions with the realistic evaluation of the planned and realized results. It also contributes to the making of better decisions on the system improvement, allocation of the necessary funds, and achieving the balance between the acceptable level of risks and their control. Therefore, the company needs to incorporate risk management into the organizational culture by creating a positive organizational culture, build risk management into the processes of planning and making decisions and provide that risk management includes all the sectors of the company's business. In addition, investing into new technology becomes the strategic resource that the company's management combines with other available resources in order to successfully manage business risks. Therefore, the implementation of the appropriate strategy of the company's business is the framework for its successful business activities.

After risks are identified and the mentioned procedures are over, it is very important to select the appropriate method or combination of methods that would, in the best way possible, efficiently remove or control exposure to risks. Depending on the size and type of exposure, certain methods can generate the wanted results, while some others are successful only when combined. It is very important to control the risk, but it is also very important to finance the risk, if it is possible and reduces costs. The main aim of risk control is its minimization, while financing the risk needs to be based on harmonization of the funds available for covering the occurred losses that come as the result of the risk.

A significant level of competition and liberalization of the telecommunications sector, at both the national and international level, demands that the telecommunications provider crate an efficient internal organization through the process of active risk management, all with the aim of better market positioning. Risk management at BH Telecom is

performed in such a way that responsibility is delegated to competent organizational units or sectors which, within the scope of their authorities, recognize, evaluate and control risks. The responsibilities in the risk management process at all organizational levels need to be clearly defined and appropriately delegated with open and simple communication among the employees. An efficient risk management system also requires that the information and acquired experience in terms of new risks and their control are passed onto precisely those organizational units that may be affected by the potential or real risk. Regarding this, it is necessary to ensure that every organizational level of management actively demands and receives the appropriate information on risk management within the scope of its activities that would enable them to plan their activities in relation to the potential risks.

The organizational structure adapted to the real needs of the company is a very important prerequisite of the efficient management of the company's risks. Through the department for the insurance of the company's property and insurance of employees, within its organizational structure BH Telecom has established a system of risk management that is suitable for its size, scope and complexity of its activities.

## **5. Conclusion**

The function of risk management, when compared to other functions within a company, has a significant contribution to the total business costs. Therefore, the importance and complexity of this managerial function increases day by day. Its importance is especially evident in the companies that provide telecommunications services. The activities of the telecommunications sector stipulate the functioning of the entire social system but also the life of the contemporary individual. This implies that telecommunications has become a factor that permeates the social life, thus being the basic condition for a modern society with developed information technology. Teletraffic, along with the accompanying processes and the technology that enables it, is a significant source of various types of risks and possible accidents. In accordance to the aforementioned, modern business conditions lead to the need for fundamental knowledge of problems re-

lated to identification, evaluation and managing of risks at all organizational levels of the companies in the telecommunications service sector. Therefore, the need is imposed in that the risk management system has become an integral part of the business strategy of every company in the telecommunications sector with the additional reason being the fact that the company's management is more aware that proper risk management can help in the reduction of business costs. Also, the process itself is aimed at protecting the company's property and profit by reducing potentials for losses and discovering sufficiently early new, still unidentified risks that can lead to potential losses.

Due to the mutual relation of various risks to which a business organization is exposed, a comprehensive approach to risks and coordination among various departments and management levels increases the probability that the right programs of risk management are provided. The company's sectors and departments need to be aware of the risks that occur as a consequence of their everyday activities and responsibilities in the supply chains. The role of individual departments in the process of risk management is observed from the aspect of the level at which these departments are involved in the process.

The implementation of the risk management model for the companies in the telecommunications sector results in the improvement of decision making on risks, it enables controlled activities, contributes to efficient allocation of the company's capital and funds, and protects and increases the company's property. Balancing between the benefit that a certain method brings and the costs it creates is the basic criterion for the application of risk management methods in the companies in the telecommunications sector. In some cases, the outer influence such as state regulations can affect the selection of the method to be applied in risk management.

Bearing in mind the aim of the paper, this research only mentioned certain issues that should be elaborated in some future studies. The emphasis should certainly be on the study into certain types of pure risks, correlation among various risks, insurance application, role of internal audit in the risk management process, and the importance of the emerging risk. All these issues should be discussed separately by sectors, both within the industrial production and services production.

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### Appendix 1 Correlation matrix

	VAR01	VAR02	VAR03	VAR04	VAR05	VAR06	VAR07	VAR08
VAR01	1.00	.808	.352	.082	.271	.425	.411	.322
VAR02	.808	1.00	.527	-.015	.300	.424	.436	.309
VAR03	.352	.527	1.00	.486	.595	.718	.335	.264
VAR04	.082	-.015	.486	1.00	.540	.597	.301	.390
VAR05	.271	.300	.595	.540	1.00	.836	.534	.738
VAR06	.425	.424	.718	.597	.836	1.00	.752	.744
VAR07	.411	.436	.335	.301	.534	.752	1.00	.757
VAR08	.322	.309	.264	.390	.738	.744	.757	1.000
VAR09	.444	.331	.256	.359	.583	.706	.847	.772
VAR10	.356	.366	.304	.309	.240	.522	.762	.420
VAR11	.258	.236	.217	.394	.705	.625	.690	.728
VAR12	.566	.435	.568	.601	.705	.748	.548	.616
VAR13	.491	.418	.551	.520	.468	.609	.468	.384
VAR14	.467	.343	.311	.427	.617	.640	.703	.612
VAR15	.366	.207	.484	.554	.620	.771	.609	.533
VAR16	.309	.243	.327	.286	.601	.631	.495	.521

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VAR09	VAR10	VAR11	VAR12	VAR13	VAR14	VAR15	VAR16
.444	.356	.258	.566	.491	.467	.366	.309
.331	.366	.236	.435	.418	.343	.207	.243
.256	.304	.217	.568	.551	.311	.484	.327
.359	.309	.394	.601	.520	.427	.554	.286
.583	.240	.705	.705	.468	.617	.620	.601
.706	.522	.625	.748	.609	.640	.771	.631
.847	.762	.690	.548	.468	.703	.609	.495
.772	.420	.728	.616	.384	.612	.533	.521
1.000	.655	.767	.748	.466	.846	.787	.621
.655	1.000	.496	.459	.456	.563	.544	.176
.767	.496	1.000	.634	.356	.725	.624	.544
.748	.459	.634	1.000	.672	.854	.807	.618
.466	.456	.356	.672	1.000	.559	.544	.358
.846	.563	.725	.854	.559	1.000	.762	.620
.787	.544	.624	.807	.544	.762	1.000	.569
.621	.176	.544	.618	.358	.620	.569	1.00

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## **UPRAVLJANJE RIZICIMA U TELEKOMUNIKACIJSKIM USLUGAMA U BOSNI I HERCEGOVINI**

### **SAŽETAK**

Pitanje upravljanja rizicima posljednjih nekoliko desetljeća postaje sve značajniji dio poslovanja svakoga poduzeća. Ovakva shvaćanja postaju sve prisutnija i u uslužnom sektoru čiji udio u BDP-u kontinuirano raste, kako u okviru nacionalnih ekonomija, tako i na globalnoj razini. Neopipljivost i neke druge specifičnosti usluga u odnosu na fizičke proizvode zahtijevaju i drugačiji pristup aktivnostima u području upravljanja rizicima, a posebno kada je riječ o kapitalno intenzivnim uslugama, kao što su usluge telekomunikacija. Ova vrsta usluga uglavnom se pruža u okviru velikih poduzeća koja moraju posebnu pažnju posvetiti procesu upravljanja rizicima, od njihove identifikacije preko evaluacije rizika do izbora i primjene primjerene metode za upravljanje rizicima. Metode za upravljanje rizicima podrazumijevaju skupinu metoda za fizičku kontrolu rizika i skupinu metoda za financiranje rizika zadržavanjem rizika ili osiguranja. Sve se one mogu primijeniti na širok spektar imovinskih i rizika odgovornosti s kojima se susreću poduzeća i zaposleni u sektoru telekomunikacija. U radu se pokušava dati osvrt na specifičnosti procesa upravljanja rizicima u poduzećima iz sektora telekomunikacija uz studiju slučaja vodećeg telekomunikacijskoga operatera u Bosni i Hercegovini.

**Ključne riječi:** rizik, upravljanje rizicima, osiguranje, nezgoda, telekomunikacijske usluge, Bosna i Hercegovina